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ABSTRACT

A random sample, predominantly black, of about 100 rural Louisiana residents was interviewed in 1979-80 to determine the extent to which rural residents' educational and occupational motivations were related to their adoption of agricultural technology. Published literature relevant to the subject was reviewed. With the exception of an "integrated pest management or control system," less than 50% of the residents were using recommended agricultural technology. For residents aged 20-55, the relationship between educational motivation and adoption of technology was positively related, but for those over 55, the relationship was negative. The relationship between residents' educational motivation and adoption of technology was negatively related for residents whether they owned small or large farms. Residents with higher levels of education tended to have higher adoption of technology. Occupational motivation and level of technology adoption were found to be positively related for residents with high income levels and negatively related for those with lower income levels. For residents aged 20-55 and over 55, the association between occupational motivation and adoption of technology was found to be negatively associated. Whether residents had high or low levels of education, associations between occupational motivation and level of adoption of technology were negative. (CM)

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# EDUCATIONAL AND OCCUPATIONAL MOTIVATION AND ADOPTION OF AGRICULTURAL TECHNOLOGY AMONG RURAL RESIDENTS

"A Preliminary Study"

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*A paper presented to the Rural Sociological Society meeting University of Guelph, Guelph, Canada August 1981. This research is a part of research data collected under the funding of USDA-SEA/CR Projects. The data reported in the paper resulted from preliminary analyses of rural residents' educational and occupational motivation and their adoption of agricultural technology. One hundred residents in Louisiana were randomly selected and personally interviewed to provide data for the analyses.

## RESEARCH LITERATURE

The purpose of this study is to determine the extent to which rural residents' educational and occupational motivation are related to their adoption of agricultural technology. Data gathered from rural residents throughout Louisiana have been utilized to investigate these relationships.

### Review of Relevant Literature

The recent renewed interest in the development of non-metropolitan areas throughout the United States, which was generally not so well predicted, suggests the need for further understanding of the way in which the social, psychological and economic characteristics of rural residents are associated to their adoption of agricultural technology.

William E. Moore (1965) suggests in his theoretical analysis of social change, that beliefs, values and attitudes may stand in the way of modernization or technological development. Since Moore's (1965) analysis, many authors including (Clark and Akinbode 1968; Roger et al., 1970; Robert H. Crawford and Williams 1974; King 1977 and Gross 1979) have associated the adoption of technology with a host of personal, social and economic characteristics of rural residents utilizing the classical diffusion model.

The basic assumption of the classical diffusion model is that the individual controls his destiny through equal access to technology; equal access to the information about the particular technology and other resources needed for its adoption. But, one could easily surmize that this assumption is not always correct. The fact is, that among poorer residents, technology is not readily accessible for varied reasons. And moreover, when knowledge new technology is available, its utilization is often suppressed because of

the lack of economic resources.

Another model commonly used to assess the adoption of technology among residents in the research literature, is the structural functional. This model seems to explain at best, the conditions now existing in rural areas. It assumes that there are certain contextual factors limiting the individual's choice of technology. On the basis of this perspective, it is easy to argue that human behavior is largely determined by external forces which the average individual has little or no control. It is precisely because of this assumption, that the social scientist must ask: What type of individual actually believes this to be the case? What characteristics does he possessed? Does he acts or waits to be acted upon?

Kluckholn and Strodtbeck (1961) hold that value orientations are antecedents of human behavior, and thus may provide the answer to the above questions. They defined value orientation as "complex but defintely pattern . . . principles . . . which give order and direction to the ever-flowing stream of human acts and thoughts, as they relate to the solution of common human problems". (p.4)

Further as Figueroa (1979) points out, values are judgements about what is right or wrong, worthwhile or about what ought to be done. The actual value orientation of any group or society will deeply influence its life-style and affect its behavior patterns, and thus the sorts and level of its achievements. The individual's values may be measured in terms of his relationship to nature or his environment.

Therefore, then, it is reasonable to assume that the individual's control-orientation is pre-supposed by his achievement-motivation orientation. Similarly, his acheivement-motivation orientation might be expected to emphasize future success more than present outcomes. In addition, his

achievement-motivation orientation seems also to imply activism or doing, or working hard at whatever the task or objective might be rather than a purely passive approach to life. It is assumed further, in regard to this study, that rural residents with high levels of adoption of technology also have high achievement motivation characteristics.

Frequently in the research literature, low motivation is associated with low income rural residents and the urban poor. But, an important question for the social scientist should be: To what extent are these individuals so classified exhibit these attributes. Understanding this question may provide the key for rural and urban development programs success. This understanding should call for the testing of the classical and structural models among more traditional families in more traditional settings. This present study attempts to test the classical diffusion model among more traditional residents in the rural South. Also, it assumes that the individual's personal characteristics are likely to be key determinants of their acceptance or rejection of any type of technology. In this case, the individual's educational and occupational characteristics.

An investigation of the extent to which rural residents' socioeconomic characteristics are associated with their adoption of agricultural technology may assist agriculturalists and economists in determining what target groups are more susceptible than others to certain levels and types of new technology.

Technology is of major importance to rural communities since the economy largely depends on income that accrue from its application. The economic and human condition of many rural areas may be improved if the residents adopt various recommendations arising out of technological developments in agricultural research around the country. But as Opare

(1977) indicates, rural residents' ability to adopt or reject certain modes of agricultural technology may be largely influenced by many socioeconomic factors.

Anderson (1965) and Leuthod (1966) suggested that the individual's age may be related to his adoption of technology. In a preliminary analysis of 50 rural residents living in the South and their adoption behavior, Hunte (1980) found that when education was controlled, rural residents who had graduated from high school regardless of age were more highly adoptive to agricultural technology.

Sawer (1974) indicates that the role which the husband's wife dominates on the farm may be associated with the level of adoption of agricultural technology present on a particular farm. Often the wife may act as the book-keeper and superviser of the farm business and purchases new inputs for the farm when she travels. In this case, the wife's educational level and knowledge of a particular type of agricultural technology may provide the better predictor for adoption of technology than the husband's.

In another study, Clark and Akimbode (1968) found evidence to support the notion that the size of the resident's farm may have influenced the adoption of technology. Allyne and Verner (1969) observed that the number of children living at home with their parents was related to families' adoption of technology. If this is so, it could have been related to the fact that in general, the young tend to be more susceptible to new ways of doing things and tend to encourage their parents to accept new ideas or technologies.

Gross (1949) found a positive association between education and the adoption behavior of residents. On the other hand, others like Graham (1954) and Belcher (1958) did not find that education was associated to adoption of technology among rural residents in the same manner as did Gross

(1949). One thing that is quite obvious at this point. The association between adoption of new technology and education may be mediated by other factors, thus accounting for inconsistent findings. For example, attitude toward education and occupation may intervene this association at times and largely influence the extent and direction of the association between education and level of technology.

The relationship between farm size and adoption of technology of rural residents has been frequently studied, but results are not together. Wilkening (1952) and Van den Ben (1957) observed positive relationships between farm size and adoption of technology. On the other hand, Hunte (1980) found that for a small sample of rural residents, farm size was inversely related to level of agricultural technology. Copp (1956) suggests that farm size and production level may be fairly good indicators of adoption of technology level.

The economic status of farm residents and their participation in educational program may be associated to the time of adoption of technology takes place. Verner and Millerd (1966) indicate that earlier adopters have a better than average economic status and higher averages of participation in educational programs.

The orientation to farming which the residents have may be extremely important in regard to the adoption of agricultural technology. This orientation include among other things residents' level of knowledge and type of persuasion techniques utilized to encourage adoption of technology. Also, the lack of compatibility between technology and the residents' attitudes, beliefs and economic status may help to determine its acceptance or rejection.

The implementation of new agricultural technology may be inhibited by the cost of that particular type of technology. For instance, very expensive agricultural technology may restrict its adoption among poorer rural residents. Therefore, even though the residents may want to adopt a particular type of technology after recognizing its positive benefits, they may limit or delay its implementation and utilization because of its cost.

Further, the adoption of new technology by rural residents may be facilitated by or associated with the way the residents themselves perceive the changes that may result from the technology itself in relationship to cultural values, beliefs and attitudes. If the new technology is perceived by the residents as disruptive of too costly to the basic traditions of their community, they may be very reluctant or reject altogether that particular type of technology.

The adoption of technology also seemed to be associated with the individual's interpersonal make-up. For example Brown et al. (1970) found that farmers who were classified as successful had a desire to be self-sufficient and independent while at the same time wanting to control their own lives. They had very positive orientations toward work and grew up knowing what work is and held the deep belief that work is paramount for successful farming or "getting the job done". In addition, these farmers were willing to work over-time and expressed the feeling that black farmers are going to have to work twice as hard as white farmers and be more dedicated.

King (1977) found that better-trained farmers were more likely to be innovators and more capable of adjusting efficiently and profitably to changes than the low-skilled. Level of education may assist in providing the answer to innovation on farms. Continuing educational research data consistently

report that the higher the education the greater is the interest and participation in educational programs. Likewise, is the individual's attitude toward learning.

Voh (1979); Clark and Akinbode (1968) reported statistically significant relationship between formal education and adoption of technology. But on the other hand, Sorokin et al. (1929) commemted that rural residents are often less interested in basic learning, especially if it does not have an extremely practical appeal. In another study, Holmes (1932) found that farmers undervalue education. England et al. (1961) found that persons residing in more rural like communities placed slightly higher value on "intellectualism" and that those respondents who were employed in agriculture placed no lower value on "intellectualism" than did the other respondents.

Although the adoption of technology has been associated with many social, economic and personal characteristics of rural residents in the rsearch literature, the directions of these various associations are not altogether consistent. Lionberger (1960) best summarizes the associations between these characteristics and the adoption of technology.

Specifically, he found that late adopters of technology had small farms, low incomes, were security-minded, were usually over age 60, complacent or skeptical, seldom participate in formal groups, utilized local farmers and adoption leaders to receive information about agricultural technology, farm papers, magazines and radios. On the other hand, the majority of farmers had average farms and incomes, were age 50 to 60 years, receptive but not actively seeking information about farms, participated in some local group activities, utilized commercial sources and agricultural agencies to obtain information about agrcultural technology (1960:34).

In summary, factors which now seemed to be important for further analyses or rural residents' innovative behavior or adoption of technology, also include those factors which are interpersonal in nature such as motivation. The research literature tend to suggest that the motivational level of rural residents my be important when assessing their adoption of productive and efficient farm practices. Motivation is defined here as the ability to overcome obstacles in order to deal effectively with one's environment.

It is assumed throughout this study, that strong beliefs and attitudes toward work and education are good indicators of the occupational and educational level of motivation among rural residents. Agricultural technology is defined as any type of recommended agricultural knowledge, skill, practice or object perceived as new by the residents (Roger and Shoemaker 1971).

Level of educational motivation is determined by residents' attitude toward education. Occupational motivation is determined similarly. Each resident was asked to indicate the extent to which he/she disagrees or agrees with statements about education and work. The items about education and work were stated: "If you were to be given the opportunity to go back to school, I would certainly go" and "If I had to get up early in the morning to go to work, I would do it" respectively.

Individuals who strongly or disagreed with either of the statements were considered having scored low on that particular factor. Individuals who strongly or agreed with either statement were considered having scored high on that particular factor.

On the basis of the research literature, this preliminary investigation is expected to find direct relationships between the independent and dependent variables.

## DESCRIPTION OF SAMPLE

About 100 rural residents living in parishes throughout Louisiana were randomly selected and interviewed between 1979-1980. The average age of these residents is 54.7 years. They are farming an average of 51.9 acres and at the same time constituting a predominately black sample. About 98 percent operated their farms part-time with about 4 children per household. The majority of wives assisted with farm chores. Ninety percent have lived in their particular community for 20 years or more and have some contact with Extension Services. About 70 percent of the residents indicated that they are farming in order to reduce the cost of family food and make extra money for to support their families. The analysis of data follows.

## ANALYSIS OF DATA

The precentages of rural residents having knowledge only, have utilized a particular type of technology and presently using a certain type of technology are shown in Table 1. The data in Table 1, indicate that with the exception of agricultural technology number 5: "Integrated pest management or control system", less than 50 percent of the residents are presently using recommemded agricultural technology.

The data in Table 2 indicate that for those residents age 20-55, the relationship between educational motivation and adoption of technology is positively related (.48), but for those residents over 55 years of age, the relationship is negative (-0.46).

The data in Table 3 present the relationship between the independent and dependent variables when size of farm is considered. The relationship between residents' educational motivation and adoption of technology is negatively related (-0.36) for residents with farm sizes 26-50 acres. Likewise, for those residents who have farms over 50 acres, this relationship was found to be -0.04.

The data in Table 4 indicate that when the effects of education were considered, residents with higher levels of education tended to have higher adoption of technology; while for those with lower levels of education, the relationship between educational motivation and adoption of technology was found to be inversely related (-0.12). For residents with higher levels of education this relationship was found to be slightly positive (.05).

The data for residents' educational motivation and level of adoption of technology are shown in Table 5 with effects of income being considered. For those residents with high income, educational motivation and adoption of technology were found to be positively related (.52); while for those residents with low incomes the relationship was negatively associated (-0.13).

Table 6-9 show the data for the relationships between level of occupational motivation and level of adoption of technology with age, size of farm, level of education and income controlled respectively.

Table 6 shows the data for the association between the independent and dependent variables with the effects of age considered. For residents age 20-55 and over 55, the association between occupational motivation and adoption of technology was found to be negatively associated. For residents in the 20-55 age group, the degree of association was found to be -0.28; while for those over 55 years of age it was -0.28.

Occupational motivation and level of adoption of technology with the effects of farm size considered are shown in Table 7. For those residents with farm sizes 26-50 acres the relationship between the independent and dependent variables was found to be direct (.54); while for those residents with farm sizes over 50 acres, it was found to be indirect (-0.71).

Table 8 shows the data for residents' occupational motivation and level of adoption of technology when level of education is considered. For residents with high and low levels of education, the associations were found to be

negative. For those with lower levels of education, this association was found to be -0.57; while for those with higher levels of education, it was .37.

The data in Table 9 indicate that for residents with high income levels, occupational motivation and level of technology were found to be positively related (.09); while for those with lower income levels the degree of association was found to be -0.49.

## SUMMARY

Some of the associations between the independent and dependent variables were found to be consistent with those in earlier studies; while others were not. No attempts were made throughout the analysis to interpret the findings because of the sizes of the cells within the tables. Also, since a singled item was used to measure residents' motivation in regard to education and occupation, reliability made be questioned. However, each of the problems mentioned above is expected to be dealt with in the final study which will utilize a large sample and composite measures to indicate educational and occupational motivation. In addition, more sophisticated statistical techniques will be applied to the final data.

TABLE 1: PERCENT OF RURAL RESIDENTS UTILIZATION OF A PARTICULAR TYPE OF AGRICULTURAL TECHNOLOGY

| Type of Technology | Percent | | |
|---|---|---|---|
| | Heard of Only | Have Utilized | Presently Utilizing |
| 1. Planting crops under best climatic condition | 33 | 29 | 38 |
| 2. Using drainage or irrigation systems | 35 | 9 | 33 |
| 3. Crop rotation for best results | 45 | 12 | 43 |
| 4. Farm planning to improve | 57 | 13 | 36 |
| 5. Integrated pest management or control system | 20 | 25 | 65 |

TABLE 2. RURAL RESIDENTS' EDUCATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WITH THE EFFECTS OF AGE CONSIDERED

| | | Level of Technology | | | | |
|---|---|---|---|---|---|---|
| | | High | | Low | | |
| Age | Educational Motivation | Number | Per Cent | Number | Per Cent | Tot |
| Over 55 years[a] | High | 22 | 73.0 | 14 | 87.0 | 36 |
| | Low | 8 | 27.0 | 2 | 13.0 | 10 |
| | Total | 30 | 100.0 | 16 | 100.0 | 46 |
| 20-55 years[b] | High | 18 | 95.0 | 19 | 86.0 | 37 |
| | Low | 1 | 5.0 | 3 | 14.0 | 4 |
| | Total | 19 | 100.0 | 21 | 100.0 | 41 |

[a]Gamma = -0.46 [b]Gamma = .48

TABLE 3. RURAL RESIDENTS' EDUCATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WITH THE EFFECTS OF FARM SIZE CONSIDERED

| | | Level of Technology | | | | |
|---|---|---|---|---|---|---|
| | | High | | Low | | |
| Farm Size | Educational Motivation | Number | Per Cent | Number | Per Cent | Tot |
| 50+ Acres[a] | High | 15 | 78.0 | 8 | 88.8 | 23 |
| | Low | 4 | 22.0 | 1 | 12.0 | 5 |
| | Total | 19 | 100.0 | 9 | 100.0 | 28 |
| 26-50 Acres[b] | High | 30 | 85.0 | 26 | 86.0 | 56 |
| | Low | 5 | 15.0 | 4 | 14.0 | 9 |
| | Total | 35 | 100.0 | 30 | 100.0 | 65 |

[a]Gamma = -0.36 [b]Gamma = -0.04

TABLE 4. RURAL RESIDENTS' EDUCATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WHEN THE EFFECTS OF EDUCATION LEVEL ARE CONSIDERED

| | | Level of Technology | | | | |
|---|---|---|---|---|---|---|
| | | High | | Low | | |
| Education | Educational Motivation | Number | Per Cent | Number | Per Cent | Tot |
| High School Graduate + [a] | High | 17 | 89.0 | 23 | 86.6 | 40 |
| | Low | 2 | 11.0 | 3 | 11.4 | 5 |
| | Total | 19 | 100.0 | 26 | 100.0 | 45 |
| Gramma School or less [b] | High | 30 | 81.0 | 11 | 84.0 | 41 |
| | Low | 7 | 9.0 | 2 | 16.0 | 9 |
| | Total | 37 | 100.0 | 13 | 100.0 | 50 |

[a] Gamma = .05 [b] Gamma = -0.12

TABLE 5. RURAL RESIDENTS' EDUCATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WHEN THE EFFECTS OF INCOME ARE CONSIDERED

| | | Level of Technology | | | | |
|---|---|---|---|---|---|---|
| | | High | | Low | | |
| Income | Educational Motivation | Number | Per Cent | Number | Per Cent | Tot |
| $3,000 or more | High | 11 | 91.0 | 6 | 75.0 | 17 |
| | Low | 1 | 9.0 | 2 | 25.0 | 3 |
| | Total | 12 | 100.0 | 8 | 100.0 | 20 |
| Less than $3,000 | High | 32 | 82.0 | 24 | 85.0 | 56 |
| | Low | 7 | 18.0 | 4 | 15.0 | 11 |
| | Total | 39 | 100.0 | 28 | 100.0 | 67 |

[a]Gamma = .57 [b]Gamma = -0.18

TABLE 6. RURAL RESIDENTS' OCCUPATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WHEN THE EFFECTS OF AGE ARE CONSIDERED

| Age | Occupational Motivation | Level of Technology | | | | |
|---|---|---|---|---|---|---|
| | | High | | Low | | |
| | | Number | Per Cent | Number | Per Cent | Tot |
| Over 55[a] years | High | 3 | 9.0 | 3 | 15.0 | 6 |
| | Low | 32 | 91.0 | 18 | 85.0 | 50 |
| | Total | 35 | 100.0 | 21 | 100.0 | 56 |
| 20-55[b] years | High | 1 | 5.0 | 2 | 9.0 | 3 |
| | Low | 19 | 95.0 | 22 | 91.0 | 41 |
| | Total | 20 | 100.0 | 24 | 100.0 | 44 |

[a] Gamma = -0.28 [b] Gamma = -0.28

TABLE 7. RURAL RESIDENTS' OCCUPATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WHEN THE EFFECTS OF SIZE OF FARM ARE CONSIDERED

| Farm Size | Occupational Motivation | Level of Technology: High Number | High Per Cent | Low Number | Low Per Cent | Tot |
|---|---|---|---|---|---|---|
| 50 + Acres[a] | High | 1 | 6.3 | 4 | 29.0 | 5 |
| | Low | 15 | 93.7 | 10 | 71.0 | 25 |
| | Total | 16 | 100.0 | 14 | 100.0 | 30 |
| 26-50[b] Acres | High | 35 | 97.0 | 31 | 91.0 | 66 |
| | Low | 1 | 3.0 | 3 | 9.0 | 4 |
| | Total | 36 | 100.0 | 34 | 100.0 | 70 |

[a]Gamma = -0.71 [b]Gamma = .54

TABLE 8. RESIDENTS' OCCUPATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WHEN THE EFFECTS OF EDUCATION ARE CONSIDERED

| Education | Occupational Motivation | Level of Technology: High Number | High Per Cent | Low Number | Low Per Cent | Tot |
|---|---|---|---|---|---|---|
| High School Graduate +[a] | High | 2 | 14.3 | 2 | 8.0 | 4 |
| | Low | 12 | 85.7 | 26 | 92.0 | 38 |
| | Tot | 14 | 100.0 | 28 | 100.0 | 42 |
| Gramma School or less[b] | High | 2 | 6.0 | 3 | 18.0 | 5 |
| | Low | 34 | 94.0 | 14 | 82.0 | 48 |
| | Tot | 36 | 100.0 | 17 | 100.0 | 53 |

[a] Gamma = .37 [b] Gamma = -0.57

TABLE 9. RURAL RESIDENTS' OCCUPATIONAL MOTIVATION AND LEVEL OF TECHNOLOGY WHEN THE EFFECTS OF INCOME ARE CONSIDERED

| | | Level of Technology | | | | |
|---|---|---|---|---|---|---|
| | | High | | Low | | |
| Income | Occupational Motivation | Number | Per Cent | Number | Per Cent | Tot |
| $3,000[a] or more | High | 1 | 9.1 | 1 | 8.0 | 2 |
| | Low | 10 | 90.9 | 12 | 92.0 | 22 |
| | Total | 11 | 100.0 | 13 | 100.0 | 24 |
| Less than $3,000 | High | 1 | 2.6 | 2 | 7.0 | 3 |
| | Low | 38 | 97.4 | 29 | 93.0 | 67 |
| | Total | 39 | 100.0 | 31 | 100.0 | 70 |

[a]Gamma = .09 [b]Gamma = -0.49

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